IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
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Sameer S. Marathe	)	Art Unit: 3683
	)	
Application No.: 10/670,857	)	Examiner: Christopher Schwartz
	)	
Filed: September 25, 2003	)	
	)	
Title: Apparatus and Method for Monitoring Braking System Pressure	)	
	)	Peoria, Illinois
Attorney Docket No.: 03-106	)	June 18, 2007
	)	

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AMENDED APPEAL BRIEF

A final Office action was issued October 27, 2005. In response, a Notice of Appeal and a Pre-Appeal Brief Request for Review were received by the Office on January 10, 2006. A Notice of Panel Decision from Pre-Appeal Brief Review was mailed on February 28, 2006. An Appeal Brief was timely filed on August 28, 2006. A Notification of Non-Compliant Appeal Brief was issued on December 18, 2006.

This Amended Appeal Brief is submitted in response to the Notification of Non-Compliant Appeal Brief and is believed to address all of the defects in the original Appeal Brief.

Applicant has simultaneously submitted a Petition to extend by five months the reply period set by the Notification of Non-Compliant Appeal Brief. The fee for the extension of time should be withdrawn from the undersigned's deposit account no. 03-1129.

1. REAL PARTY IN INTEREST

The real party in interest in this appeal is Caterpillar Inc., the assignee of the present patent application. The assignment document assigning all interest in this patent application to Caterpillar Inc. has been duly recorded at the U.S. Patent and Trademark Office.

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals nor interferences.

3. STATUS OF CLAIMS

The status of the claims in the application is:

1	rejected and appealed herein;
2-9	cancelled;
10	rejected and appealed herein;
11-14	cancelled;
15-24	rejected and appealed herein;
25-27	cancelled;
28-34	rejected and appealed herein.

4. STATUS OF AMENDMENTS

There are no amendments that have not been entered.

5. SUMMARY OF CLAIMED SUBJECT MATTER

A) Summary of Disclosure

The present patent application describes a system for monitoring pressures in a hydraulic system, such as a hydraulic braking system in order to detect certain faults. Methods for determining a cut-in pressure, a cut-out pressure, and an accumulator charge pressure are disclosed. The claims which now remain in the application all relate to methods of determining an accumulator charge pressure, and methods of troubleshooting potential problems related to an accumulator.

Figure 1 of the application illustrates the basic system components of an exemplary braking system. The exemplary braking system includes a hydraulic pump 116, an accumulator charge valve 120, and an accumulator 105. Specification, para. 11-12. The accumulator 105 is included in the system to assist in providing proper and instantaneous braking force during a braking event. Specification, para. 2. Those of ordinary skill in this art are familiar with and understand these components of a braking system. It is well understood that the accumulator assists by ensuring that braking fluid in the system is adequately and constantly pressurized before a braking event. It is also well understood that the accumulator assists by ensuring that the pressure of the braking fluid does not decrease too rapidly during a braking event. The braking fluid is typically incompressible so without an accumulator any release of braking fluid from the system to supply the brakes could result in the pressure decreasing rapidly. The accumulator has some type of compressible or expandable element, which is

analogous to a capacitor in an electrical system, which helps maintain the pressure of the braking fluid in the system.

In a certain type of known gas accumulator that is schematically illustrated as accumulator 105 in the present application, the above functions are accomplished by providing in the accumulator 105 two chambers 108 and 110 that are separated by a diaphragm 112. Specification, para. 11. The first chamber 108 is in communication with the braking fluid in the braking system. Specification, para. 11. The second chamber 110 is filled with a gas, typically an inert gas such as nitrogen. Specification, para. 11. Those of ordinary skill in this art understand that at the time of manufacture of the accumulator 105, or when it is installed in a braking system, the second chamber 110 is filled with a quantity of gas until the gas reaches a certain pressure. In this patent application, that certain pressure is *expressly* defined by the term "accumulator charge pressure" in the specification. *See* Specification, para. 3. Those of ordinary skill in this art further understand that if the gas leaks out of the second chamber 110, the accumulator charge pressure will decay until the accumulator 105 no longer functions properly. If the accumulator charge pressure falls below a certain prescribed level, a technician may wish to add additional gas, repair the accumulator, or replace the accumulator. The method of determining an accumulator charge pressure described in this application will assist a technician in knowing whether any of these actions is necessary.

Other methods of determining the accumulator charge pressure are known. Those of ordinary skill in this art understand that the accumulator charge pressure cannot be determined by taking measurements of the gas pressure in the accumulator at any random time. The

pressure of the braking fluid in the braking system effects the pressure of the gas. Because the pressure of the braking fluid rises and falls during normal operation of the braking system, the pressure of the gas also rises and falls. In order to measure the gas pressure to determine the accumulator charge pressure, the relative pressure of the braking fluid in the brake system must be at zero. For example, a standard practice for some braking systems is for the technician to turn off the machine, then climb into the machine's cab and bleed all the pressure from the brake system by pumping the brakes several times. Once the pressure of the braking fluid is zero, the technician must then climb out of the cab, attach a pressure gauge to the accumulator, and take a reading of the accumulator charge pressure. This process is cumbersome, time consuming, and can even result in the unintentional release of gas from the accumulator. The method of determining an accumulator charge pressure described in the application is an alternative to the known methods, and has certain advantages.

A pressure monitoring apparatus 101 can determine the accumulator charge pressure using the novel method described in the application. The illustrated pressure monitoring apparatus 101 includes a pressure transducer 122 and an ECM 124. Specification, para. 13-14. The pressure transducer 122 is coupled to the first chamber 108 of the accumulator 105. Specification, para. 13. Thus, the pressure transducer 122 outputs a signal indicative of the braking fluid pressure of the braking system. Specification, para. 13. An alternative arrangement could include a pressure transducer coupled to the second chamber 110 which would output a signal indicative of the gas pressure. Specification, para. 13. However, having the pressure transducer 122 coupled to the first chamber is preferable primarily for the reason

that a braking system typically also needs to monitor the pressure of the braking fluid. If the pressure transducer 122 were coupled to the second chamber 110, a second pressure transducer coupled to the first chamber 108 would still be needed to measure the pressure of the braking fluid. In addition, many braking systems similar to the one illustrated in Figure 1 already have a pressure transducer, or a pressure sensing switch, coupled to the first chamber 108 to monitor the pressure of the braking fluid. The pressure monitoring apparatus 101 can thus be implemented less expensively (but not exclusively) by using such an existing pressure transducer 122 already coupled to the first chamber 108.

The application describes a novel technique for using the output of the pressure transducer 122 which monitors the braking fluid pressure to also determine the accumulator charge pressure. Specification, para. 15-16. Assuming that the pressure of the braking fluid has decayed to zero, the method begins when the machine starts and the pump 116 or other pressure source is activated. Specification, para. 15. Next, the ECM receives and records a pressure reading of the braking fluid from pressure transducer 122. Specification, para. 16. A given time interval later, the ECM then receives from the pressure transducer 122 a new pressure reading, which it compares to the recorded, previous pressure reading. Specification, para. 16. If the new pressure reading meets certain criteria, then it becomes the recorded pressure reading (overwriting the previous pressure reading). Specification, para. 16. The criteria for determining whether the new pressure reading will be retained and recorded is based upon the observation that the pressure of the braking fluid after system start up will first climb rapidly, then build at a decreased rate. Specification, para. 23. Those of ordinary skill in this art will recognize that this

occurs because while the braking fluid pressure is first climbing rapidly, the volume of the second chamber 110 of accumulator 105 remains constant, until the braking fluid exceeds a certain pressure and the volume of the second chamber 110 begins to contract while the volume of the first chamber 108 begins to expand, resulting in the pressure of the braking fluid building at a decreased rate. Thus, the criteria for determining whether the new pressure reading will be retained and recorded looks at the difference between the current and the immediately prior pressure reading, and whether the current reading is greater than or less than the immediately prior pressure reading. Specification, para. 16.

At the end of a relatively short predetermined period of time for measuring the braking fluid pressure (the specification uses the specific example of one second), the last braking fluid pressure reading recorded in the ECM is assumed to relate to the accumulator charge pressure. Specification, para. 16. This reading can then be used to compare to a desired accumulator charge pressure and generate appropriate warnings for an operator or technician. Specification, para. 17.

B) Summary of Claim 1

Claim 1 is directed to a braking system 100 having a gas accumulator 105, Specification, para. 11, a pressure detection device 121, Specification, para. 13, and a monitoring device 123, Specification, para. 14. Claim 1 recites that the gas accumulator 105 provides a supply of hydraulic braking fluid to the braking system 100 for use in applying a brake, the gas accumulator having a gas initially pressurized to a pre-charge pressure. Specification, para. 11.

Claim 1 further recites that the pressure detection device 121 measures the pressure of the hydraulic braking fluid in the gas accumulator and responsively produces an output signal. Specification, para. 13. Claim 1 further recites that the monitoring device 123 receives the output signal of the pressure detection device 121. Specification, para. 14. Claim 1 further recites that the monitoring device 123 uses the output signal to determine the pre-charge pressure of the gas in the gas accumulator, compares the pre-charge pressure to a pressure limit, and uses the results of the comparison in generating a fault signal. Specification, para. 15-16.

C) Summary of Claim 10

Claim 10 is directed to a method of monitoring hydraulic braking fluid pressure in a braking system of a vehicle. More specifically, the braking system of claim 10 is of the type including an accumulator 105. Specification, para. 11. The method recited in claim 10 comprises measuring the pressure of the hydraulic braking fluid and responsively producing an output signal. Specification, para. 13. The recited method further comprises processing the output signal to estimate an accumulator pre-charge pressure. Specification, para. 15-16. The recited method further comprises comparing the estimate of the accumulator pre-charge pressure with an ideal value. Specification, para. 17.

D) Summary of Claim 21

Claim 21 is directed to a hydraulic system comprising an accumulator 105, Specification, para. 11, a pump 116, Specification, para. 12, a pressure detection device 121, Specification, para. 13, and a monitoring device 123, Specification, para. 14. Claim 21 recites

that the accumulator 105 provides a supply of pressurized hydraulic fluid to the hydraulic system. Specification, para. 12. Claim 21 further recites that the accumulator 105 comprises at least a first chamber 108 for hydraulic fluid which has a first minimum volume when the hydraulic fluid is less than a first pressure, and which expands to a volume greater than the first minimum volume only after the hydraulic fluid is greater than the first pressure. Specification, para. 11. Claim 21 further recites that the pump 116, when actuated, provides pressurized hydraulic fluid to the first chamber 108 of the accumulator 105. Specification, para. 23. Claim 21 further recites that the pressure detection device 121 measures the pressure of the hydraulic fluid in the first chamber 108 of the accumulator 105 and responsively produces an output signal. Specification, para. 13. Claim 21 further recites that the monitoring device 123 receives the output signal of the pressure detection device 121, and that the monitoring device 123 identifies an estimate of the first pressure (the first pressure being a term defined in claim 21 itself) and uses the estimate of the first pressure in determining whether to produce a fault signal. Specification, para. 15-17.

E) Summary of Claim 30

Claim 30 is directed to a vehicle comprising a set of wheels, an engine which provides power to drive one or more of the wheels, and a brake associated with one wheel of the set of wheels. Specification, para. 1-2. Claim 30 is further directed to a vehicle having an accumulator 105, Specification, para. 11, a pump 116, Specification, para. 12, a pressure detection device 121, Specification, para. 13, and a monitoring device 123, Specification, para. 14.

Claim 30 recites that the accumulator 105 provides a supply of pressurized hydraulic braking fluid for use in applying the brake. Specification, para. 12. Claim 30 further recites that the accumulator 105 comprises at least a first chamber 108 for hydraulic braking fluid which has a first minimum volume when the hydraulic braking fluid is less than a first pressure, and which expands to a volume greater than the first minimum volume only after the hydraulic braking fluid is greater than the first pressure. Specification, para. 11. Claim 30 further recites that the accumulator also comprises a second volume 110 containing a pressurized gas, the pressurized gas being pressurized to a pre-charge gas pressure when there is no hydraulic braking fluid in the first chamber 108. Specification, para. 11. Claim 30 further recites that the second volume 110 also has a cooperative relation with the first chamber 108 whereby the second volume contracts when the first volume expands, and the second volume expands when the first volume contracts. Claim 30 further recites that the pump 116, when actuated, provides pressurized hydraulic braking fluid to the first chamber 108 of the accumulator105. Specification, para. 23.

Claim 30 further recites that the pressure detection device 121 measures the pressure of the hydraulic braking fluid in the first chamber of the accumulator and responsively produces an output signal. Specification, para. 13. Claim 30 further recites that the monitoring device 123 receives the output signal of the pressure detection device 121, Specification, para. 14, wherein the monitoring device 121 samples the pressure of the hydraulic braking fluid in the first chamber 108 of the accumulator 105 in response to and within a 3 second time period, Specification, para. 16, following a detection of an engine start-up to calculate the first pressure

(which is defined in claim 30 itself), Specification, para. 15, and compares the first pressure to an ideal value, Specification, para. 17.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection under review in this appeal are:

A) Whether claims 1 and 15-16 are unpatentable for being obvious under 35 U.S.C. § 103(a)

B) Whether claims 10 and 17-20 are unpatentable for being obvious under 35 U.S.C. § 103(a)

C) Whether claims 21-24 and 28-29 are unpatentable for being obvious under 35 U.S.C. § 103(a)

D) Whether claims 30-34 are unpatentable for being obvious under 35 U.S.C. § 103(a)

7. ARGUMENT

Only for the purpose of efficiently resolving this appeal, arguments for the patentability of the claims in this application will be grouped. However, applicant maintains that the dependent claims in each of these groups are separately patentable. Only in the interest of narrowing the issues in this appeal, arguments for the patentability of the claims will be grouped, and separate arguments for the patentability of the dependent claims will not be presented.

A) Are claims 1 and 15-16 unpatentable for being obvious under 35 U.S.C. § 103(a)?

Claim 1 is independent and claims 15-16 depend therefrom. The Office action rejected claim 1 for allegedly being obvious under 35 U.S.C. § 103(a) in view of the combination of U.S. Patent No. 6,132,012 to Ishii ("the Ishii patent"), U.S. Patent Application Publication No. 2002/0038977 from Nitta et al. ("the Nitta publication"), and U.S. Patent No. 6,494,545 to Nakamura et al. ("the Nakamura patent"). Applicant contends this rejection was incorrect for at least the following reasons.

Claim 1 recites:

> ...a pressure detection device which measures the pressure of the hydraulic braking fluid in the gas accumulator and responsively produces an output signal;
>
> a monitoring device which receives the output signal; and
>
> wherein the monitoring device uses the output signal to determine the pre-charge pressure of the gas in the gas accumulator, compares the pre-charge pressure to a pressure limit, and uses the results of the comparison in generating a fault signal.

(Applicant notes that previous versions of claim 1 recited an "accumulator charge pressure" in the place of "the pre-charge pressure of the gas in the gas accumulator." Applicant asserts that these terms are synonymous. Applicant amended "accumulator charge pressure" to "the pre-charge pressure of the gas in the gas accumulator" according to the patent examiner's suggestion given during a telephonic interview, because the patent examiner refused to give

weight to the express definition of the term "accumulator charge pressure" which is given in the specification. *See* specification, para. 3.)

Thus, claim 1 requires a pressure detection device which measures "the pressure of the hydraulic braking fluid in the gas accumulator" and a monitoring device which uses the measurement of the braking fluid pressure to "determine the pre-charge pressure of the gas in the gas accumulator."

Applicant asserts that neither the Ishii patent, the Nitta publication, nor the Nakamura patent discloses or suggests this limitation. The Ishii patent merely discloses measuring the pressure of the braking fluid in an accumulator, but the Ishii patent says nothing concerning how that measurement of the braking fluid can be used to determine the pre-charge pressure of the gas in the accumulator.

The Office action admits that the Ishii patent does not include "a discussion of measuring the pressure of the hydraulic braking fluid and using this measure pressure value to determine the "pre-charge" pressure of the gas in the gas (chamber) of the accumulator." Office action, page 3. The Office action then states that "[t]he examiner takes this to mean simply using the measurement of hydraulic fluid pressure in the accumulator to determine the pressure in the gas chamber." Office action, page 3.

Assuming this statement is an attempt at construing the limitations of claim 1, this construction is clearly erroneous. The claim recites "determin[ing] the ***pre-charge pressure of the gas*** in the gas accumulator."(emphasis added) The alleged construction of claim 1 equates

"the pre-charge pressure of the gas in the gas accumulator" to any pressure of the gas at any state of the accumulator. As those of ordinary skill in this art understand, the pressure of the gas in the accumulator changes as the volume of the gas chamber in the accumulator changes. The pre-charge pressure of the gas is the pressure of the gas when the gas chamber is at its greatest volume, which occurs when there is no pressure on the braking fluid side of the accumulator which could otherwise reduce the volume of the gas chamber. Measuring the pre-charge pressure of the gas is not the same as measuring the pressure of the gas in the accumulator at any state.

The Office action makes no attempt to explain why the alleged claim construction set forth therein is correct. The Office action simply says "[t]he examiner takes this to mean …." Office action, page 3. No other authority or reasoning is cited. Claims must be interpreted according to their meaning to those of ordinary skill in the art in light of the specification and claims as a whole. In this case, those of ordinary skill in the art understand that determining the pre-charge pressure of the gas is not the same as measuring the gas pressure at any state. For example, as explained above in the Summary of the Invention section of this Appeal Brief, technicians in this field understand that to measure the pre-charge pressure of the gas directly, the braking system pressure must first be bled by pumping the brakes several times with the source of pressurized braking fluid turned off. Then if a pressure gauge is connected directly to the gas chamber of the accumulator, the pressure will at this state will be the pre-charge pressure.

The Office action makes no attempt to explain where the Ishii patent, the Nitta publication, or the Nakamura patent discusses determining the pre-charge pressure of the gas in

the gas accumulator. Instead, the Office action merely incorrectly construes this limitation to mean measuring the pressure at any state, and concludes that the Ishii patent meets this limitation because it discusses measuring some pressure. While the Ishii patent may discuss measuring the pressure of the braking fluid at various time intervals, the Ishii patent does not disclose how to tell which one of the measurements of the braking fluid pressure can be related to the pre-charge pressure of the gas in the accumulator.

Construed according to the understanding of one of ordinary skill in this art, "determin[ing] the ***pre-charge pressure of the gas*** in the gas accumulator" means determining the pressure of the gas in the accumulator's gas chamber when the gas chamber is at its greatest volume. Neither the Ishii patent, the Nitta publication, nor the Nakamura patent discusses anything remotely related to determining the pre-charge pressure of the gas in the gas accumulator. For at least this reason, the rejection of claims 1 and 15-16 was incorrect and should be reversed.

B) Are claims 10 and 17-20 unpatentable for being obvious under 35 U.S.C. § 103(a)?

Claim 10 is independent and claims 17-20 depend therefrom. The Office action rejected claim 1 for allegedly being obvious under 35 U.S.C. § 103(a) in view of the combination of the Ishii patent, the Nitta publication, and the Nakamura patent. Applicant contends this rejection was incorrect for at least the following reasons.

Claim 10 recites:

> ...measuring the pressure of the hydraulic braking fluid and responsively producing an output signal;
>
> processing the output signal to estimate an accumulator pre-charge pressure....

Applicant asserts that neither the Ishii patent, the Nitta publication, nor the Nakamura patent discloses or suggests the limitation of "estimat[ing] an accumulator pre-charge pressure" by processing measurements of the hydraulic braking fluid pressure. While the Ishii patent discloses collecting measurements of the pressure of the braking fluid in an accumulator, it says nothing concerning how to select one of those measurements to estimate the accumulator pre-charge pressure.

As already explained above in this Appeal Brief in the section for Issue I, the Office action admits that the Ishii patent does not include "a discussion of measuring the pressure of the hydraulic braking fluid and using this measure pressure value to determine the "pre-charge" pressure of the gas in the gas (chamber) of the accumulator." Office action, page 3. The Office action then states that "[t]he examiner takes this to mean simply using the measurement of hydraulic fluid pressure in the accumulator to determine the pressure in the gas chamber." Office action, page 3.

Assuming this statement is an attempt at construing the limitations of claim 10, this construction is clearly erroneous. The reason why this claim construction is erroneous when applied to claim 10, is the same as the reason why it is erroneous when applied to claim 1. The

reason why this claim construction is erroneous when applied to claim 1 has already been explained in the section of the Appeal Brief for Issue I and need not be repeated here.

The Office action makes no attempt to explain where the Ishii patent, the Nitta publication, or the Nakamura patent discusses estimating the accumulator pre-charge pressure. Instead, the Office action merely incorrectly construes this limitation to mean measuring the pressure at any state, and concludes that the Ishii patent meets this limitation because it discusses measuring some pressure. While the Ishii patent may discuss measuring the pressure of the braking fluid at various time intervals, the Ishii patent does not disclose how to determine which one of the measurements of the braking fluid pressure can be related to the pre-charge pressure of the gas in the accumulator.

Construed according to the understanding of one of ordinary skill in this art in light of the specification and claims, "estimat[ing] an accumulator pre-charge pressure" means determining the pressure of the gas in the accumulator's gas chamber when the gas chamber is at its greatest volume. Neither the Ishii patent, the Nitta publication, nor the Nakamura patent discusses anything remotely related to determining the pre-charge pressure of the gas in the gas accumulator. For at least this reason, the rejection of claims 10 and 17-18 was incorrect and should be reversed.

C) Are claims 21-24 and 28-29 unpatentable for being obvious under 35 U.S.C. § 103(a)?

Claim 21 is independent and claims 22-24 and 28-29 depend therefrom. Claims 21-22 were rejected for allegedly being obvious under 35 U.S.C. § 103(a) in view of the combination of the Ishii patent, the Nitta publication, and the Nakamura patent. Claims 23-24 and 28-29 were rejected for allegedly being obvious under 35 U.S.C. § 103(a) in view of the combination of the Ishii patent, the Nitta publication, and the Nakamura patent, and further modified by U.S. Patent No. 6,669,311 to Holst et al., or U.S. Patent No. 5,445,441 to Inagawa et al., and further modified by U.S. Patent No. 3,923,334 to Sekigawa et al. or U.S. Patent No. 6,595,559 to Harris et al. Applicant contends this rejection, as best understood, was incorrect for at least the following reasons.

Claim 21 recites:

> …an accumulator providing a supply of pressurized hydraulic fluid to the hydraulic system, the accumulator comprising at least a first chamber for hydraulic fluid which has a first minimum volume when the hydraulic fluid is less than a first pressure, and which expands to a volume greater than the first minimum volume only after the hydraulic fluid is greater than the first pressure….

While the previous claims recited a "pre-charge pressure of the gas in a gas accumulator"(claim 1) or an "accumulator pre-charge pressure"(claim 10), claim 21 recites "a first pressure" and provides a definition of the "first pressure" in the claim itself. The "first pressure" is the pressure of the hydraulic fluid in the accumulator when the volume of the first chamber in the accumulator expands to more than a minimum volume. Those of ordinary skill in this art understand that in an accumulator, the volume of the hydraulic fluid chamber will remain constant, at a minimum volume, until the pressure of the fluid builds great enough that the force of the fluid on the accumulator expands the volume. This occurs because the accumulator is pre-

loaded. In a gas type accumulator, this pre-load is achieved by pre-charging the gas to a certain pressure. In an accumulator which might use a spring, the spring may be preloaded.

Claim 21 further recites:

> ...a pressure detection device which measures the pressure of the hydraulic fluid in the first chamber of the accumulator and responsively produces an output signal;
>
> a monitoring device which receives the output signal of the pressure detection device, wherein the monitoring device identifies an estimate of the first pressure, and uses the estimate of the first pressure in determining whether to produce a fault signal.

Thus, claim 21 requires a pressure detection device to produce an output signal responsive to the pressure in the first chamber, and a monitoring device which receives the output signal and identifies an estimate of the "first pressure."

The Office action does not include any explanation of where in the Ishii patent, the Nitta publication, or the Nakamura patent there is any discussion of determining a "first pressure," defined in claim 21 as the pressure at which the hydraulic fluid chamber of the cylinder "expands to a volume greater than the first minimum volume." In fact, the only mention in the Office action of claim 21 is the perfunctory statement that "[r]egarding claims 15-17, 21-22 these requirements are met by the combined teachings above." Office action, page 4. A careful review of the Office action reveals that it does not even include the words "first pressure" or "volume," which are each key terms in claim 21. No attempt whatsoever has been made to

construe the limitations of claim 21, or to apply the limitations to the prior art which allegedly renders the claim obvious.

Applicant considers it sufficient for the purpose of this appeal to assert that a *prima facie* case of obviousness has not been made because of the insufficient explanation of the rejection in the Office action. For at least this reason, the rejection of claim 21 should be reversed.

Applicant also asserts that none of the prior art references alleged to render these claims obvious discloses any method to determine a first pressure at which the hydraulic fluid chamber of an accumulator begins to expand in volume. The Office action recognizes that the Ishii patent discusses measuring the pressure of the hydraulic fluid in the accumulator, but neither the Ishii patent nor the Office action explains how to determine the "first pressure" as it is defined in claim 21 from a group of hydraulic fluid pressures measured at different times. Only applicant's present application explains how this can be done.

For at least these reasons, Applicant asserts that the rejection of these claims was incorrect and should be reversed.

D) Are claims 30-34 unpatentable for being obvious under 35 U.S.C. § 103(a)?

Claim 30 is independent and claims 31-34 depend therefrom. Claims 30-34 were rejected for allegedly being obvious under 35 U.S.C. § 103(a) in view of the combination of the

Ishii patent, the Nitta publication, and the Nakamura patent, and further modified by U.S. Patent No. 6,669,311 to Holst et al., or U.S. Patent No. 5,445,441 to Inagawa et al., and further modified by U.S. Patent No. 3,923,334 to Sekigawa et al. or U.S. Patent No. 6,595,559 to Harris et al. Applicant contends this rejection, as best understood, was incorrect for at least the following reasons.

Claim 30 recites:

> ...an accumulator providing a supply of pressurized hydraulic braking fluid for use in applying the brake, the accumulator comprising at least a first chamber for hydraulic braking fluid which has a first minimum volume when the hydraulic braking fluid is less than a first pressure, and which expands to a volume greater than the first minimum volume only after the hydraulic braking fluid is greater than the first pressure....

While the previous claims recited a "pre-charge pressure of the gas in a gas accumulator"(claim 1) or an "accumulator pre-charge pressure"(claim 10), claim 30 recites "a first pressure" and provides a definition of the "first pressure" in the claim itself. The "first pressure" is the pressure of the braking fluid in the accumulator when the volume of the first chamber in the accumulator expands to more than a minimum volume. Those of ordinary skill in this art understand that in a brake accumulator, the volume of the braking fluid chamber will remain constant, at a minimum volume, until the pressure of the braking fluid builds great enough that the force of the fluid on the accumulator expands the volume. This occurs because the accumulator is pre-loaded. In a gas type accumulator, this pre-load is achieved by pre-charging the gas to a certain pressure.

Claim 30 further recites:

> ...a pressure detection device which measures the pressure of the hydraulic braking fluid in the first chamber of the accumulator and responsively produces an output signal;
>
> a monitoring device which receives the output signal of the pressure detection device, wherein the monitoring device samples the pressure of the hydraulic braking fluid in the first chamber of the accumulator in response to and within a 3 second time period following a detection of an engine start-up to calculate the first pressure, and compares the first pressure to an ideal value.

Thus, claim 30, similar to claim 21, requires a pressure detection device to produce an output signal responsive to the pressure in the first chamber, and a monitoring device which receives the output signal and identifies an estimate of the "first pressure."

The Office action does not include any explanation of where in the seven references cited against claim 30 there is any discussion of determining a "first pressure," defined in claim 30 as the pressure at which the hydraulic fluid chamber of the cylinder "expands to a volume greater than the first minimum volume." A careful review of the Office action reveals that it does not even include the words "first pressure" or "volume." No attempt whatsoever has been made to construe the limitations of claim 30, or to apply the limitations to the prior art which allegedly renders the claim obvious.

Applicant considers it sufficient for the purpose of this appeal to assert that a *prima facie* case of obviousness has not been made because of the insufficient explanation of the rejection in the Office action. For at least this reason, the rejection of claim 30 should be reversed.

Applicant also asserts that none of the seven prior art references alleged to render these claims obvious discloses any method to determine a "first pressure" at which the hydraulic fluid chamber of an accumulator begins to expand in volume. The Office action recognizes that the Ishii patent discusses measuring the pressure of the hydraulic fluid in the accumulator, but neither the Ishii patent nor the Office action explains how to determine the "first pressure" as it is defined in claim 30 from a group of hydraulic braking fluid pressures measured at different times. Only applicant's present application explains how this can be done.

For at least these reasons, applicant asserts that the rejection of these claims was incorrect and should be reversed.

8. CLAIMS APPENDIX

1. A braking system comprising:

a gas accumulator providing a supply of hydraulic braking fluid to the braking system for use in applying a brake, the gas accumulator having a gas initially pressurized to a pre-charge pressure;

a pressure detection device which measures the pressure of the hydraulic braking fluid in the gas accumulator and responsively produces an output signal;

a monitoring device which receives the output signal; and

wherein the monitoring device uses the output signal to determine the pre-charge pressure of the gas in the gas accumulator, compares the pre-charge pressure to a pressure limit, and uses the results of the comparison in generating a fault signal.

2-9. (Cancelled)

10. A method of monitoring hydraulic braking fluid pressure in a braking system of a vehicle, the braking system including an accumulator, the method comprising:

measuring the pressure of the hydraulic braking fluid and responsively producing an output signal;

processing the output signal to estimate an accumulator pre-charge pressure; and

comparing the estimate of the accumulator pre-charge pressure with an ideal value.

11-14. (Cancelled)

15. The braking system of claim 1 wherein the monitoring device records the pressure of the hydraulic braking fluid in the gas accumulator within a fixed amount of time after a braking system start-up is detected to determine the pre-charge pressure.

16. The braking system of claim 15 wherein the monitoring device is further capable of determining a cut-in pressure of the braking system and comparing the cut-in pressure to a cut-in pressure limit, the monitoring device using this comparison in generating a fault signal.

17. The method of claim 10 wherein comparing the estimate of the accumulator pre-charge pressure with an ideal value further comprises:

calculating a difference between the estimate of the accumulator pre-charge pressure and the ideal value to produce an error value.

18. The method of claim 17 further comprising:

comparing the error value to a preset limit value and using that comparison to determine whether a fault signal should be generated.

19. The method of claim 10 wherein processing the output signal to estimate an accumulator pre-charge pressure further comprises comparing several hydraulic braking fluid pressures and determining which one is the best estimate of the accumulator pre-charge pressure.

20. The method of claim 19 wherein processing the output signal to estimate an accumulator pre-charge pressure further comprises sampling each of the several hydraulic braking fluid pressures at predetermined times after a braking system start-up is detected.

21. A hydraulic system comprising:

an accumulator providing a supply of pressurized hydraulic fluid to the hydraulic system, the accumulator comprising at least a first chamber for hydraulic fluid which has a first minimum volume when the hydraulic fluid is less than a first pressure, and which expands to a volume greater than the first minimum volume only after the hydraulic fluid is greater than the first pressure;

a pump which when actuated provides pressurized hydraulic fluid to the first chamber of the accumulator;

a pressure detection device which measures the pressure of the hydraulic fluid in the first chamber of the accumulator and responsively produces an output signal;

a monitoring device which receives the output signal of the pressure detection device, wherein the monitoring device identifies an estimate of the first pressure, and uses the estimate of the first pressure in determining whether to produce a fault signal.

22. The hydraulic system of claim 21 wherein the monitoring device identifies the estimate of the first pressure by recording the pressure of the hydraulic fluid in the first chamber of the accumulator at a time immediately after the first chamber expands beyond the first volume.

23. The hydraulic system of claim 21 wherein the monitoring device identifies the estimate of the first pressure by recording several pressures of the hydraulic fluid in the first chamber of the accumulator within a predetermined time after a system start-up is detected.

24. The braking system of claim 23 wherein the monitoring device selects one of the several pressures to be the first hydraulic fluid pressure.

25-27. (Cancelled)

28. The braking system of claim 24 wherein the predetermined time is 3 seconds.

29. The braking system of claim 24 wherein the predetermined time is 2 seconds.

30. A vehicle comprising:

a set of wheels;

an engine which provides power to drive one or more of the wheels;

a brake associated with one wheel of the set of wheels;

an accumulator providing a supply of pressurized hydraulic braking fluid for use in applying the brake, the accumulator comprising at least a first chamber for hydraulic braking fluid which has a first minimum volume when the hydraulic braking fluid is less than a first pressure, and which expands to a volume greater than the first minimum volume only after the hydraulic braking fluid is greater than the first pressure, the accumulator further comprising a second volume containing a pressurized gas, the pressurized gas being pressurized to a pre-charge gas pressure when there is no hydraulic braking fluid in the first chamber; the second volume also having a cooperative relation with the first volume whereby the second volume contracts when the first volume expands, and the second volume expands when the first volume contracts;

a pump which when actuated provides pressurized hydraulic braking fluid to the first chamber of the accumulator;

a pressure detection device which measures the pressure of the hydraulic braking fluid in the first chamber of the accumulator and responsively produces an output signal;

a monitoring device which receives the output signal of the pressure detection device, wherein the monitoring device samples the pressure of the hydraulic braking fluid in the first chamber of the accumulator in response to and within a 3 second time period following a detection of an engine start-up to calculate the first pressure, and compares the first pressure to an ideal value.

31. A vehicle according to claim 30 wherein if the first pressure is less than the ideal value, the monitoring device detects a fault.

32. A vehicle according to claim 30 wherein when the monitoring device samples the pressure of the hydraulic braking fluid in the first chamber of the accumulator in response to and within a 3 second time period following a detection of an engine start-up, the monitoring device records a plurality of pressure measurements, then determines which one is the best representative of the first pressure.

33. A vehicle according to claim 32 further comprising a pressure sensitive valve in communication with the pump and the accumulator having a cut-in pressure and a cut-out pressure, the valve opening to permit pressurized hydraulic braking fluid to flow from the pump to the accumulator when the pressure of the hydraulic braking fluid in the first chamber of the accumulator falls below the cut-in pressure, and the valve closing to prevent pressurized hydraulic braking fluid from flowing from the pump to the accumulator when the pressure of the hydraulic braking fluid in the first chamber of the accumulator rises above the cut-out pressure.

34. The braking system of claim 33 wherein the monitoring device identifies the cut-in pressure and the cut-out pressure of the valve by monitoring the pressure of the hydraulic braking fluid in the first chamber of the accumulator.

9. EVIDENCE APPENDIX

None.

10. RELATED PROCEEDINGS INDEX

None.

11. CONCLUSION

Applicant asserts that each of the arguments presented in this appeal should resolved in the favor of the applicant, and that each of the rejections in the Office action should be reversed.

Any fees required by this Amended Appeal Brief, the accompanying Petition, or as a result of any other requirement at any time during the pendency of this patent application may be withdrawn from the undersigned's deposit account no. 03-1129.

If a decision is made to reopen prosecution of the application, the patent examiner is encouraged to telephone the undersigned representative for a quick resolution of any outstanding issues to place this application in condition for allowance.

Respectfully submitted,

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